Fertility

Pasture Fertilization *Illinois*

Introduction

Pastures respond to a fertilization program like any other crop. However, in designing a pasture fertilization program, the producer must consider the productivity of the grazing animals, the plant species present, and the management level and goals for the pasture. Fertilizing pastures is different than fertilizing for hay. Research data and farmer experience has shown that pasture productivity can be increased two to three times with a well-planned and managed fertilization program.

Starting Point

A current and accurate soil test is the best guide in designing a pasture fertilization program. Collect one composite sample per 2 ½ acres in late summer or early fall. Ideally, each paddock should be sampled separately. Slope and aspect should be sampled separately. Avoid sampling where livestock tend to "camp" (near water and shade).

Soil samples should be analyzed for pH, available phosphorus (P_1), and potassium.

For existing pastures, sample to a 7-inch depth and collect a few samples (maybe 20% of total), in a separate container, to a 2-inch depth for pH only. Where lime is needed, adjust the rate to account for surface application (lime rate dependent upon the volume of soil neutralized). Some testing laboratories make lime recommendations based on sampling depth.

When planning to establish a new pasture in a prepared seedbed, plan ahead. Sample 6 months to a year before seeding, to a 7-inch depth and incorporate needed lime with tillage at least 6 months before seeding.

Species and pH

Pasture grasses can grow over a wider range of pH than legumes. As a general guide, soil pH for cool-season grass pastures should be 6.0 to 7.0 and 6.5 to 7.0 for legume pastures. A minimum pH of 6.5 is suggested for legume/cool-season grass mixtures.

Legumes "make" N

Legumes "fix" atmospheric nitrogen and make it available for plant growth. If legumes comprise 30 percent or more of the sward, do not apply nitrogen fertilizer since an adequate amount will be contributed through fixation. If the legume portion is less than 30 percent, grass will probably respond to nitrogen fertilizer.

Studies have indicated that a legume-cool season grass mixture produces more than a nitrogen-fertilized grass pasture.

Legumes should be properly inoculated when seeded to assure good nodulation.

Impact of P and K

Phosphorus (P) and potassium (K) are essential nutrients for plant production. Once the soil is corrected to optimal soil test levels (P_1 of 40 to 50 pounds per acre and K of 260 to 300 pounds per acre) for these nutrients, monitor their status by soil testing every 4 years. Optimal levels will vary by soil type, area of the state, and to a certain extent by the species grown. Once these optimal levels have been reached, additional P and K fertilizer is not considered economical nor does it provide for consistent yield responses.

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USDA NRCS Natural Resources Conservation Service
University of Illinois Extension College of Agriculture, Consumer and Environmental Sciences
Illinois Department of Agriculture
ILGLCI Illinois Grassland Conservation Initiative

Grass Needs N

Nitrogen is essential for the formation of protein and thus stimulates production. Nitrogen fertilizer should be considered for a grass dominant pasture. Research indicates that the first 30 to 50 pounds per acre of nitrogen are used most efficiently and that split applications of this amount generally maximize yield.

Grass pastures will respond quickly to nitrogen-make sure you can utilize the forage produced.

The first application should be made in late summer to stimulate growth for fall production (for those utilizing deferred grazing or stockpiling, an early August application is suggested). The second application should be made in early June when the spring flush of grass growth is over. Since early season growth is generally excessive, an early spring application is not suggested unless the first harvest can be efficiently grazed or will be harvested as hay or silage. Nitrogen application early in the season can make the grazing management of the spring flush more difficult.

Source of nitrogen is important for summer application. Urea or UAN solutions are easily lost if a 0.5-inch rain does not occur shortly after application. Ammonium and nitrate forms of nitrogen are non-volatile and can be applied without significant loss.

Nutrient Cycling

Sixty to 80 percent of the P and K removed by grazing is returned or recycled on the pasture in the form of manure and urine. Grazing animals also recycle a significant amount of N from consumed pasture forage. Nitrogen in urine is quickly converted to available ammonium and nitrate. Nitrogen in dung is slowly released and utilized by surrounding grass.

Manure distribution is greatly affected by grazing management. Manure and urine distribution is more uniform on rotationally grazed pastures since animals spend less time in any one site and forages are grazed more evenly. A high stocking density and short grazing period will also improve the uniformity of manure distribution.

Manure as Fertilizer

In addition to the nutrients distributed during grazing, some producers spread manure on pastures. This is an acceptable practice but needs to be done with caution. Manure should be applied shortly after a grazing period. It should be applied first to grass pastures. Manure can make the forage less palatable. There will be volatilization loss of nitrogen from surface applied manure. One should monitor P and K soil test levels. To minimize P and K runoff, do not apply to sloping, frozen ground.

Plant Analysis

Tissue analysis can be used to diagnose forage production problems (especially status of micronutrients), to check the nutritional status of the forage, and to fine-tune fertility and grazing management. Tissue analysis should be used with, not instead of, soil test results.

For More Details

Additional information is found in the *Illinois Agronomy Handbook* available at Extension offices.

Summary

Fertilization, along with well-managed livestock and forage, is key to an efficient pasture program. Pasture fertilization management is a continuous process.

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